

TOOL HOLDING AND WORKING PIECE-CLAMPING ASSEMBLY FOR A MACHINE TOOL

3 BACKGROUND OF THE INVENTION

4 1. Field of the Invention

5 The present invention relates to a tool holding and working piece-
6 clamping assembly, and more particularly to a tool holding and working piece-
7 clamping assembly for a machine tool and that has only a single threaded rod for
8 actuating a tool holding device and a working piece-clamping device.

9 2. Description of Related Art

10 A machine tool comprises a working piece-clamping device for
11 clamping a working piece and a tool holding device for holding a tool, such as a
12 induction heating device, such that the working piece can be worked to a desired
13 shape or form with the tool. Two threaded rod assemblies with driving devices
14 are needed to respectively actuate the tool holding device and the working
15 piece-clamping device to move to fit with the forming process of the working
16 piece.

17 However, the cost for mounting two thread rod assemblies in a machine
18 tool is high. In addition, it is needs two power sources applied to the driving
19 device for respectively actuating the threaded rod assemblies to operate, and this
20 will cause excessive power consumption.

21 To overcome the shortcomings, the present invention tends to provide a
22 tool holding and working piece-clamping assembly to mitigate or obviate the
23 aforementioned problems.

1 **SUMMARY OF THE INVENTION**

2 The main objective of the invention is to provide a tool holding and
3 working piece-clamping assembly that has only one threaded rod with a driving
4 device to reduce the consumption of power. The tool holding and working
5 piece-clamping assembly has a stand, a driving device, a threaded rod, a rail
6 assembly, a brake post, a working piece-clamping device and a tool holding
7 device. The threaded rod is rotatably mounted on the stand and is driven by the
8 driving device. The rail assembly and the brake post are mounted on the stand
9 and are parallel to the threaded rod. The working piece-clamping device has an
10 upper clamping device slidably connected to the rail assembly and a lower
11 clamping device corresponding to the upper clamping device. The working
12 piece-clamping device further has a connecting plate, an upper base, a contact
13 switch and a brake. The connecting plate is connected to the rail assembly, and
14 the upper base is attached to the connecting plate for the upper clamping device
15 being attached to the upper base. The contact switch is mounted on the
16 connecting plate. The brake is electrically connected to the contact switch and is
17 slidably mounted on the brake post. The tool holding device is slidably
18 connected to the rail assembly and has a connecting base, at least one pushing
19 block, an actuating block and a moving base. The connecting base is slidably
20 connected to the rail and is screwed with the threaded rod. The pushing block is
21 mounted on the connecting base and corresponds to the connecting plate. The
22 actuating block is attached to the connecting base and aligns with the actuating
23 arm of the contact switch. The moving base is attached to the connecting base
24 and is located between the upper clamping device and the lower clamping

1 device.

2 Other objects, advantages and novel features of the invention will
3 become more apparent from the following detailed description when taken in
4 conjunction with the accompanying drawings.

5 **BRIEF DESCRIPTION OF THE DRAWINGS**

6 Fig. 1 is a perspective view of a tool holding and working piece-
7 clamping assembly in accordance with the present invention;

8 Fig. 2 is a perspective view of the upper clamping device and the lower
9 clamping device of the tool holding and working piece-clamping assembly in
10 Fig. 1;

11 Fig. 3 is a side plan view of the tool holding and working piece-clamping
12 assembly in Fig. 1; and

13 Fig. 4 is an operational side plan view of the tool holding and working
14 piece-clamping assembly in Fig.1.

15 **DETAILED DESCRIPTION OF PREFERRED EMBODIMENT**

16 With reference to Figs. 1 to 3, a tool holding and working piece-
17 clamping assembly for a machine with a tool in accordance with the present
18 invention comprises a stand (12), a driving device (13), a threaded rod (14), a rail
19 assembly, a working piece-clamping device (20) and a tool holding device (30).

20 The stand (12) is securely connected to the machine. In practice, a housing (10)
21 with a window (11) is secured on the machine, and the stand (12) is attached to
22 the housing (10). The driving device (13) is mounted on the top of the stand (12).

23 The driving device (13) can be a motor. The threaded rod (14) is rotatably
24 mounted on the stand (12) and is driven by the driving device (13). The rail

1 assembly is mounted on the stand (12) and is parallel to the threaded rod (14).
2 The rail assembly comprises two rails (15) attached to the stand (12) and
3 respectively located at two sides of the threaded rod (14). A brake post (16) is
4 mounted on the stand (12) and is parallel to the threaded rod (14).

5 The working piece-clamping device (20) has an upper clamping device
6 (28) and a lower clamping device (41). The upper clamping device (28) is
7 slidably connected to the rail assembly, and the lower clamping device (41)
8 corresponds to the upper clamping device (28) and is securely connected to the
9 housing (10). The working piece-clamping device (20) further comprises a
10 connecting plate (23) connected to the rail assembly. The connecting plate (23) is
11 mounted between two upper sliders (24), wherein each upper slider (24) is
12 attached to one of the rails (15) of the rail assembly, such that the connecting
13 plate (23) is slidably connecting to the rail assembly through the upper sliders
14 (24). An upper base (27) is attached to the connecting plate (23) and the upper
15 clamping device (28) is attached to the upper base (27). The upper base (27)
16 extends through the window (11) in the housing (10). A lower base (40) is
17 attached to the housing (10) for the lower clamping device (41) being mounted
18 on the lower base (40). A contact switch (25) with an actuating arm (26) is
19 mounted on the connecting plate (23). A brake (21) is electrically connected to
20 the contact switch (25) and is slidably mounted on the brake post (16). The brake
21 (21) engages with the brake post (16) until the actuating arm (26) of the contact
22 switch (25) is pushed. With the engagement between the brake (21) and the
23 brake post (26), the upper base (27) with the upper clamping device (28) can be
24 positioned at a desired top level.

1 The tool holding device (30) is slidably connected to the rail assembly
2 and has a connecting base (31), two pushing blocks (36), an actuating block (33)
3 and a moving base (34). The connecting base (31) is slidably connected to the
4 rails (15) and is screwed with the threaded rod (14). In practice, a lower slider
5 (32) is attached to each respective rail (15) for the connecting base (31) being
6 attached between the lower sliders (32). The pushing blocks (36) are mounted on
7 the connecting base (31) and correspond to the connecting plate (23). The
8 actuating block (33) is attached to the connecting base (31) and aligns with the
9 actuating arm (26) of the contact switch (25). The moving base (34) is attached
10 to the connecting base (31) and is located between the upper clamping device (28)
11 and the lower clamping device (41). The moving base (34) extends through the
12 window (11) in the housing (10), and a tool (35), such as an induction heating
13 device, is mounted on the moving base (34).

14 In addition, a first bellows shutter (50) has two ends respectively
15 attached to the top end of the window (11) and the upper base (27). A second
16 bellows shutter (502) has two ends respectively attached to the upper base (27)
17 and the moving base (34). A third bellows shutter (504) has two ends
18 respectively attached to moving base (34) and the lower end of the window (11).
19 With the arrangement of the bellows shutters (50,502,504), the driving device
20 (13) and the threaded rod (14) can be separated from the tool (35) and the
21 working piece (60) so as to keep the driving device (13) and the threaded rod (14)
22 from being damaged during the operation of the machine.

23 With reference to Figs. 1, 3 and 4, when the driving device (13) is
24 switched on, the threaded rod (14) will be rotated in a direction. The connecting

1 base (31) will be moved upward by the threaded rod (14) along the rails (15).
2 When the actuating block (33) on the connecting base (31) contacts with and
3 pushes the actuating arm (26) of the contact switch (25), the brake (21) will be
4 released. The pushing blocks (36) will push the connecting plate (23) with the
5 upper clamping device (28) to move upward with the connecting base (31).
6 When the upper clamping device (28) moves to a desired high level, the user
7 turns off the driving device (13). Then, a working piece (60) is put on and
8 supported on the lower clamping device (41). The driving device (13) is then
9 turned on to rotate the threaded rod (14) in an opposite direction so as to actuate
10 the connecting base (31) to move downward. The connecting plate (23) with the
11 upper base (27) and the upper clamping device (28) will also move downward
12 due to gravity until the upper clamping device (28) contacts with the working
13 piece (60). During the downward movement of the connecting plate (23), the
14 actuating arm (26) of the contact switch (25) keeps contact with the actuating
15 block (33), such that the brake (21) is kept in a released condition.

16 When the upper clamping device (28) contacts with the working piece
17 (60), the connecting plate (23) with the upper base (27) and the upper clamping
18 device (28) will stop moving but the connecting base (31) will keep move. When
19 the connecting base (31) keeps moving downward, the actuating block (33) will
20 leave the position where the block (33) pushes the actuating arm (26) of the
21 switch (25). The brake (21) will engage with the brake post (16) so as to keep the
22 upper base (27) with the upper clamping device (28) at the position where the
23 upper clamping device (28) contacts with the working piece (60). Consequently,
24 the working piece (60) is securely held between the upper clamping device (28)

1 and the lower clamping device (41). Accordingly, the working piece (60) can be
2 worked to the desired shape or form with the tool (35) attached to the moving
3 base (34) that moves along the rails (15) by the actuation of the driving device
4 (13) and the transmission of the threaded rod (14).

5 With such a tool holding and working piece-clamping assembly, only
6 one threaded rod (14) and one driving device (13) are needed. The cost for
7 manufacturing a machine with a tool holding and working piece-clamping
8 assembly in accordance with the present invention is reduced. In addition,
9 because only one threaded rod needs to be driven to actuate the assembly in
10 accordance with the present invention to operate, the power consumption is also
11 reduced and the power waste is prevented.

12 Even though numerous characteristics and advantages of the present
13 invention have been set forth in the foregoing description, together with details
14 of the structure and function of the invention, the disclosure is illustrative only,
15 and changes may be made in detail, especially in matters of shape, size, and
16 arrangement of parts within the principles of the invention to the full extent
17 indicated by the broad general meaning of the terms in which the appended
18 claims are expressed.